

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
7 April 2005 (07.04.2005)

PCT

(10) International Publication Number  
**WO 2005/031392 A2**

- (51) International Patent Classification<sup>7</sup>: **G02B**
- (21) International Application Number:  
PCT/IL2004/000884
- (22) International Filing Date:  
22 September 2004 (22.09.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
60/505,870 26 September 2003 (26.09.2003) US
- (71) Applicant (for all designated States except US): **RAMOT  
AT TEL-AVIV UNIVERSITY LTD.** [IL/IL]; P.O.Box  
39296, 32 Haim Levanon St., 61392 Tel Aviv (IL).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **NATHAN, Men-  
achem** [IL/IL]; Arueh Suslik 5, 69359 Tel Aviv (IL).
- (74) Agent: **FRIEDMAN, Mark**; 7 Jabotinsky St., 52520 Ra-  
mat Gan (IL).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

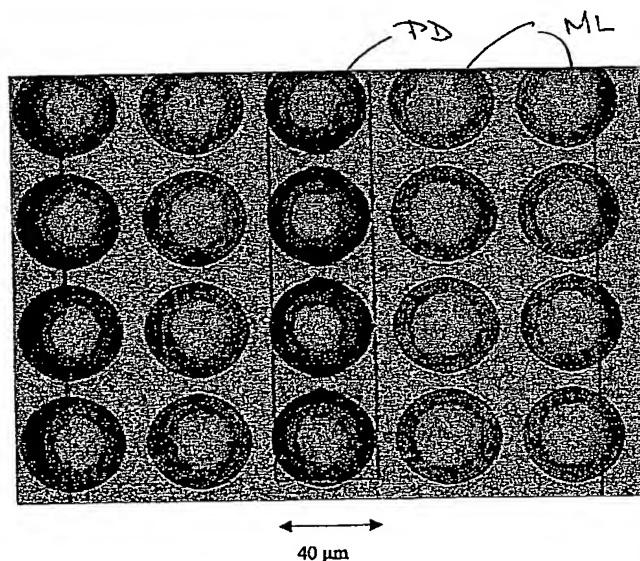
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: INTEGRATED MICROLENS REFLECTOR AND LIGHT COUPLER



(57) Abstract: A microlens reflector and light coupler comprises a material transparent to light of a predetermined wavelength bound by an envelope with a curved section and at least two non-parallel flat sections, the curved section operative to reflect internally light entering the component through one flat section, the reflected light directed to leave the component through its other flat section. The microlens reflector can reflect and couple light from one optical element into another optical element, e.g. from a waveguide into a detector, and from a light source into a waveguide. Arrays of integrated microlens reflectors may be used to couple optical fibers to on-chip optical waveguides in NxM optical cross-connects and switches, providing simple, true 3-dimensional optical coupling architectures.

BEST AVAILABLE COPY

WO 2005/031392 A2



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*